AF 1711

06459 USA (APC-3007US) PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/672,363	: Confirmation No.: 3026
Applicant	:	John W. Miller	
Filed	:	26 September 2003	
For	:	BLOWING AGENT ENHANCERS FOR POLYURETHANE FOAM PRODUCTION	
Art Unit	:	1711	
Examiner	:	John M. Cooney	
Notice of Appeal	:	August 31, 2006	
Docket No.	:	06459 USA (APC-3007US)	
Customer No.	:	23543	

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SUBSTITUTE APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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SIR:

In response to the Notification of Non-Compliant Appeal Brief dated December 15, 2006, Appellant submits herewith this Substitute Appeal Brief which replaces the Appeal Brief filed on November 6, 2006. Appellant hereby appeals from the decision dated June 27, 2006, rejecting claims 1, 6-17, and 21-30, and requests consideration and reversal of the rejection of these claims.

I. REAL PARTY IN INTEREST

The real Party In Interest in this matter is Air Products and Chemicals, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-30 are pending in the application. Claims 2-5 and 18-20 have been withdrawn, and claims 1, 6-17, and 21-30 stand rejected. All of these rejections are appealed herewith.

Claims 1, 15, 16, 21, 22, and 24 are independent.
Claims 6-14 and 25 depend directly from claim 1.
Claim 26 depends from claim 15.
Claims 17 and 27 depend from claim 16.
Claim 28 depends from claim 21.
Claims 23 and 29 depend from claim 22.
Claim 30 depends from claim 24.

Appellant contends that all of claims 1, 6-17, and 21-30 are patentable over the cited prior art, and provides arguments and support for that contention in the sections provided below.

IV. STATUS OF AMENDMENTS

No amendments have been filed after the Final Office Action of June 27, 2006. As filed on September 26, 2003, the subject application had 24 total claims. Among those claims were seven independent claims, namely, claims 1, 15, 16, 18, 21, 22, and 24.
Claims 2-14 depended directly from claim 1.
Claim 17 depended from claim 16.
Claims 19 and 20 depended from claim 18.
Claim 28 depended from claim 21.
Claims 23 depended from claim 22.

A first Office Action, dated September 22, 2004, rejected claims 1-24 under 35 U.S.C. § 112, 1st paragraph, as failing to comply with the enablement requirement. Claims 1, 3, 7-14, 16-19, and 21-24 were rejected under 35 U.S.C. § 102(b) as anticipated by Cornet et al. (6,034,145) and Patterson (5,488,071), each taken individually. Claims 1, 3, 7-14, 16-19, and 21-24 were rejected under 35 U.S.C. § 102(b) as anticipated by Ramer et al. (3,875,086). Claims 2, 4-6, 15 and 20 were rejected under 35 U.S.C. § 103(a) as unpatentable over Cornet et al., Patterson (5,488,071), Patterson (5,484,817), and Ramey et al., each taken individually, and further in view of Brunnemann et al. (5,876,802).

A telephonic interview between the examiner and Appellant's representative, Frank Tise, was held on December 20, 2004. Agreement was reached that no amendment was required to overcome the § 112 1st paragraph rejection set forth in the first Office Action, and that language of claims 1-24 was acceptable.

Appellant filed a Response to the first Office Action on December 22, 2004. The Response amended claims 1, 2, 3, 16, 18, 21, 22 and 24 to further distinguish the claimed invention from the cited references. In the December 22 Response, Appellant also provided detailed remarks specifying the limitations in the amended claims which are not taught, described, or suggested in the art relied on in the rejection, and explaining how and why such limitations render the claimed subject matter patentable over the cited art.

A second (nonfinal) Office Action, dated April 19, 2005, withdrew all of the rejections and issued new rejections of all of claims 1-24 over newly cited art. Claims 18-20 and 24 were rejected under 35 U.S.C. § 102(b) as anticipated by Bogdan et al. (6,086,788). Claims 2 and 3 were rejected under 35 U.S.C. § 102(b) as anticipated by Hibino et al. (2003/0078312). Claims 1-24 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1-20 of copending Application No. 10/700,163 (now U.S. Pat. No. 6,921,779).

Appellant filed a Response to the second Office Action on July 1, 2005. The Response amended claims 2, 18, 20 and 24 to further distinguish the claimed invention from the cited references, and again provided detailed remarks explaining why the claims were patentable over the cited art. Appellant also indicated willingness to file a terminal disclaimer to overcome the provisional obviousness-type double patenting rejection, upon allowance of the claims.

A third (nonfinal) Office Action was issued on September 20, 2005, imposing a requirement to elect a single species for the blowing agent enhancers of claims 1-23 and a

single species for each of the two groups so blowing agent enhancers or claim 24. The examiner also requested a showing of support for the amendment to R' in claim 2, and support for the listing of R group members in claim 24.

Appellant filed a Response to the third Office Action on October 12, 2005, electing ethylene glycol monobutyl ether as the single species for examination of claims 1-23, and elected ethylene glycol monobutyl ether and octyl alcohol as the single species for each of the groups of blowing agent enhancers of claim 24. The elections were without traverse. Claims 6 and 15 were amended to replace diethylene glycol monomethyl ether with ethylene glycol monobutyl ether. Appellant also provided support for the amendment to R' in claim 2, and support for the listing of R group members in claim 24.

A fourth (nonfinal) Office Action was issued on January 13, 2006, rejecting claims 1, 6-17 and 21-24, and indicating that claims 2-5 and 18-20 had been withdrawn as being directed to non-elected species. All of the rejections in the April 19, 2005 Office Action were withdrawn. Claims 1, 6, 1, 14, 16, 21, 22 and 24 were rejected under 35 U.S.C. § 102(b) as anticipated by Blum et al. (4,581,432). Claims 1, 6-17 and 21-24 were rejected under 35 U.S.C. § 103(a) as unpatentable over Blum et al. in view of Bogdan et al. (6,086,788). Claims 1-24 were rejected under the judicially created doctrine of obviousness-type double patenting as unpatentable over claims 1-20 of U.S. Pat. No. 6,921,779.

Appellant filed a Response to the fourth Office Action on April 13, 2006. The Response amended claims 1, 16, 21, 22 and 24 to further distinguish the claimed invention from the cited references, and added new claims 25-30, each of which depended from one of claims 1, 15, 16, 21, 22 and 24. Appellant reiterated a willingness to file a terminal disclaimer to overcome the obviousness-type double patenting rejection, upon allowance of the claims.

A fifth (final) Office Action was issued on June 27, 2006, rejecting claims 1, 6-17 and 21-30 under 35 U.S.C. § 103(a) as unpatentable over Blum et al. in view of Bogdan et al. as cited above. An obviousness-type double patenting rejection of claims 1, 6-17 and 21-30 was issued, and the examiner indicated that deferral of address of this topic until allowable subject matter was determined would be acceptable.

Appellant filed a Response to the fifth (final) Office Action on August 31, 2006, setting forth reasons why the 35 USC § 103 rejections should be withdrawn. No amendments were made. A Notice of Appeal was also filed on August 31, 2006, and entered into USPTO records on September 6, 2006.

An Advisory Action was issued on October 4, 2006, stating that the request for reconsideration in the Response to the fifth (final) Office Action had been considered but had not placed the application in condition for allowance.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention set forth in the claims currently under examination provides compositions for making polyurethane foams, methods of making polyurethane foams with those compositions, and polyurethane products resulting from the reaction of the ingredients of those compositions. The compositions all include a blowing agent enhancer and a blowing agent (which comprises a hydrohalocarbon), in addition to one or both of a polyol and a polyisocyanate. The blowing agent enhancer may be selected from either of two groups. The first group includes various ethers, and consists of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether, and mixtures of any of these. The second group consists of compounds having a molecular weight less than about 500 g/mol and a molecular formula of ROH; wherein R is selected from the group consisting of methyl, ethyl, pentyl isomers, hexyl isomers, heptyl isomers, octyl isomers, nonyl isomers, decyl isomers, C5-C10 cycloaliphatic groups, C7-C10 araliphatic groups, C1-C10 aliphatic groups comprising a nitrogen atom or oxygen atom, C5-C10 cycloaliphatic groups comprising a nitrogen atom or oxygen atom, and C7-C10 araliphatic groups comprising a nitrogen atom or oxygen atom.

Appellant has found that inclusion of a blowing agent enhancer as described above can enhance the efficiency of the hydrohalocarbon blowing agent, resulting in improved flow[1] and/or reduced use level of the blowing agent while retaining at least equal physical properties, in some cases with an actual improvement in compression strength of the resulting polyurethane foam[2].

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[1] Application at [0037]

Independent claim 1 claims a composition for producing a polyurethane foam[3], the composition comprising a polyol[4], a polyisocyanate[5], a blowing agent comprising a hydrohalocarbon[6], and at least 4 pphp[7] of a blowing agent enhancer comprising at least one compound selected from the group[8] consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether, or a mixture[9] of any of these.

Independent claim 15 claims a composition for producing a polyurethane foam[10], the composition comprising a polyol[11], a polyisocyanate[12], HFC-245fa[13], and at least 4 pphp[14] in total of one or both of ethylene glycol monobutyl ether[15] and dipropylene glycol dimethyl ether[16].

Independent claim 16 claims a method of making[17] a polyurethane foam[18], the method comprising combining a polyol[19] and a polyisocyanate[20] in the presence of 1) a blowing agent comprising a hydrohalocarbon[21] and 2) at least 4 pphp[22] of a blowing agent enhancer comprising at least one compound selected from the group[23] consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene

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[2] Application at [0041]
[3] Page 4 line 6
[4] Page 5, lines 5-24
[5] Page 4 line 21 to page 5 line 2
[6] Page 5 line 26 to page 6 line 18
[7] Page 8 line 8
[8] Page 7 lines 19-23
[9] Page 6 line 32
[10] Page 4 line 6
[11] Page 5, lines 5-24
[12] Page 4 line 21 to page 5 line 2
[13] Page 6 line 3
[14] Page 8 line 8
[15] Page 7 line 21
[16] Page 7 line 18
[17] Page 1 lines 4-6
[18] Page 4 line 6
[19] Page 5, lines 5-24
[20] Page 4 line 21 to page 5 line 2
[21] Page 5 line 26 to page 6 line 18
[22] Page 8 line 8
[23] Page 7 lines 19-23

glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether.

Independent claim 21 claims a polyurethane composition comprising a product[24] of a reaction between a polyol[25] and a polyisocyanate[26], the reaction taking place in the presence of 1) a blowing agent comprising a hydrohalocarbon[27] and 2) at least 4 pphp[28] of a blowing agent enhancer selected from the group[29] consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether.

Independent claim 22 claims a composition for producing a polyurethane foam[30], the composition comprising 1) one but not both[31] of a polyol[32] and a polyisocyanate[33], 2) a blowing agent comprising a hydrohalocarbon[34] and 3) a blowing agent enhancer comprising at least one compound selected from the group[35] consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether,

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[24] Page 4, lines 1-19
[25] Page 5, lines 5-24
[26] Page 4 line 21 to page 5 line 2
[27] Page 5 line 26 to page 6 line 18
[28] Page 8 line 8
[29] Page 7 lines 19-23
[30] Page 4 line 6
[31] Page 3, lines 17-18 and claim 22 as filed
[32] Page 5, lines 5-24
[33] Page 4 line 21 to page 5 line 2
[34] Page 5 line 26 to page 6 line 18
[35] Page 7 lines 19-23

wherein at least 4 pphp[36] of the blowing agent enhancer is present if said one but not both of a polyol and a polyisocyanate is a polyol.

Independent claim 24 claims a composition for producing a polyurethane foam[37], the composition comprising a polyol[38], a polyisocyanate[39], a blowing agent comprising a hydrohalocarbon[40], and at least 4 pphp[41] of a blowing agent enhancer comprising at least one compound selected from the group[42] consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether and compounds[43] having a molecular weight less than about 500 g/mol and a molecular formula of ROH; wherein:

> R is selected from the group consisting of methyl, ethyl, pentyl isomers, hexyl isomers, heptyl isomers, octyl isomers, nonyl isomers, decyl isomers, C5-C10 cycloaliphatic groups, C7-C10 araliphatic groups, C1-C10 aliphatic groups comprising a nitrogen atom or oxygen atom, C5-C10 cycloaliphatic groups comprising a nitrogen atom or oxygen atom, and C7-C10 araliphatic groups comprising a nitrogen atom or oxygen atom.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following issue on appeal:

Whether claims 1, 6-17 and 21-30 are unpatentable under 35 U.S.C. § 103(a) over Blum et al. in view of Bogdan et al.

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[36] Page 8 line 8
[37] Page 4 line 6
[38] Page 5, lines 5-24
[39] Page 4 line 21 to page 5 line 2
[40] Page 5 line 26 to page 6 line 18
[41] Page 8 line 8
[42] Page 7 lines 19-23
[43] Page 7 line 31 to page 8 line 3, and page 6 lines 25-29

VII. ARGUMENT

Rejection of claims 1, 6-17 and 21-30 under 35 U.S.C. § 103(a) as unpatentable over Blum et al. in view of Bogdan et al.

Appellant provides below his arguments and contentions with respect to the above grounds of rejection. Appellant will first provide specific recitations from, and comments about, the teachings of Blum et al. and Bogdan et al., and will then rebut the pending rejections.

Blum et al. (hereinafter "Blum") discloses compositions which are storage-stable at room temperature and which can be heat-cured to form molded parts having polyurethane, polyurea, and polyisocyanurate groups. The compositions contain (a) one or more polyols having a molecular weight of from 400 to 10,000 and a functionality of from 2 to 8, (b) at least one polyfunctional compound having a molecular weight of 62 to 400 and being selected from the group consisting of aliphatic hydroxyl compounds, cycloaliphatic hydroxyl compounds, aromatic amino compounds, or mixtures thereof, and (c) an organic polyisocyanate which is present in the form of discrete particles, which are deactivated on their surfaces and are dispersed in the liquid component. Depending on the product needs, (d) catalysts, (e) blowing agents, (f) reinforcing materials, and (g) auxiliaries and/or additives may optionally be included. The single-component systems are used for the preparation of cellular or noncellular, optionally reinforced polyurethane, polyurea, and/or polyisocyanurate group-containing molded parts[44]. Blum's blowing agents include water[45] and liquids which are inert relative to the organic polyisocyanate and which have boiling points under 100°C, including halogenated hydrocarbons such as methylene chloride, trichlorofluoromethane, dichlorodifluoromethane, dichloromonofluoromethane, dichlorotetrafluoroethane, and 1,1,2-trichloro-2,3,3-trifluoroethane. Mixtures of these low-boiling-point liquids with one another and/or with other substituted or unsubstituted hydrocarbons can also be used[46].

Regarding compounds disclosed in the present application for use as blowing agent enhancers, Blum makes only two references. These are in Examples 3 and 5, which both use ethylene glycol monobutyl ether to dissolve the catalyst (triethylenediamine) that Blum uses for forming his polyurethanes. Blum gives no indication as to why he dissolves the catalyst, but in the absence of any explanation the reader might reasonably assume that this is done to

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[44] Blum, Abstract and column 12 lines 23-25
[45] Blum, column 13 line 9
[46] Blum, column 13 lines 16-28

facilitate handling, because triethylenediamine is a solid at ambient temperatures and dissolving it would provide the catalyst in an easier-to-handle liquid form. In both Examples, Blum uses less ethylene glycol monobutyl ether than the 4pphp (parts per hundred polyol) level recited as a minimum in the instant claims. Specifically, he uses 1.2 pphp (2 parts per 168 total polyol) in Example 3 and 3.2 pphp (4.5 parts per 138.7 [i.e., 88.7 + 50] of polyol) in Example 5. The ratio of glycol ether to catalyst also varies from 2:1 for Example 3 to 3:1 for Example 5. Blum provides no explanation as to why the amounts of glycol ether differ in Examples 3 and 5, and there is no further mention at all of ethylene glycol monobutyl ether, or any of the presently claimed blowing agent enhancers.

Bogdan et al. (hereinafter "Bogdan") discloses the addition of alpha-methyl styrene, isobutanol and/or isopropanol to reduce vapor pressure, improve k-factor (insulating ability), enhance the solubility of the blowing agent in the premix and/or improve the processing characteristics of polyurethane and polyisocyanurate closed-cell foams prepared with a blowing agent comprising a hydrofluorocarbon selected from the group consisting of 1,1,1,3,3-pentafluoropropane, 1,1,1,2-tetrafluoroethane, 1,1,2,2-tetrafluoroethane, and mixtures thereof. Bogdan does not teach the use of any of the blowing agent enhancers recited in the present claims.

In contrast to both Blum and Bogdan, Appellant has found that certain performance properties of polyurethane compositions may, as described above in section V., be improved by the addition of certain compounds ("blowing agent enhancers") in amounts sufficient to improve the function of hydrohalocarbon blowing agents.

Rejection of claims 1, 6-17 and 21-30 under 35 U.S.C. § 103(a) as unpatentable over Blum in view of Bogdan is improper, because the feature of at least 4 pphp of ethylene glycol monobutyl ether is not provided.

The Office Action has rejected claims 1, 6-17 and 21-30 under 35 U.S.C. § 103(a) as unpatentable over Blum in view of Bogdan. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.[47] However, Bogdan does not teach the use of ethylene glycol monobutyl ether at all, and Blum does not

teach its use in an amount of at least 4 pphp as recited in the present claims. Thus, a proper obviousness rejection would have to establish that the person of ordinary skill, reading these references, would nonetheless be led to use at least 4 pphp of ethylene glycol monobutyl ether. Appellant submits that the Office Action fails to do this, and has therefore not provided the 4 pphp claim element as required for a *prima facie* case of obviousness. The reasons for this conclusion will now be discussed in detail.

The Office Action asserts the following:

> "...Blum et al. does disclose variation in the amount of ethylene glycol monobutyl ether for purposes of controlling dissolution of catalyst (see again Examples 3 and 5). Accordingly, it would have been obvious ... to have controlled the amount of ethylene glycol monobutyl ether employed in the preparation of Blum et al. for the purpose of controlling catalyst dissolution effects in the preparation formed in order to arrive at the products and processes of applicant's claims with the expectation of success in the absence of a showing of new or unexpected results. It has long been held that where the general conditions of the claims are disclosed in the prior art, discovering the optimal or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233, *In re Reese* 129 USPQ 402." [emphasis added][48]

In support of this argument, the Office Action also states that:

> "...employment of ethylene glycol monobutyl ether for dissolution of catalyst is sufficient evidence that ethylene glycol monobutyl ether is a variable which achieves a recognized result of dissolving catalyst."[49]

The above arguments rest on the premise that Blum seeks to control catalyst dissolution effects, and that he does this by varying the amount of ethylene glycol monobutyl ether. Appellant is unable to find any hint at all in Blum that he is interested in "controlling catalyst dissolution effects," other than an implicit interest in simply dissolving the catalyst. This understanding is in accord with the above cited passage from the Office Action, which states that dissolution of catalyst is the result that the reader of Blum recognizes to be produced by using an appropriate amount of ethylene glycol monobutyl ether. Appellant asserts that this is in fact the only effect suggested by Blum. The Office Action provides no teaching of Blum, nor

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[47] *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)
[48] Final Office Action, paragraph spanning pages 2 and 3

even the examiner's own suggestion, as to any other "catalyst dissolution effects" that might purportedly be controlled by changing the level of ethylene glycol monobutyl ether.

Blum's lack of any mention of "controlling catalyst dissolution" undercuts any contention that the control of other effects (beyond merely dissolving catalyst) motivates his variations in ethylene glycol monobutyl ether level. Blum does not suggest any other reason for varying the level of this material. He does not disclose or even suggest that varying the amount of ethylene glycol monobutyl ether is useful for any particular purpose, other than the implicit teaching of catalyst dissolution. There is no explanation regarding why the amounts of ethylene glycol monobutyl ether differ in Examples 3 and 5, or even an indication that changing from one glycol ether level to the other has any effect at all, and the reader thus derives no teaching or suggestion as to how to vary this parameter, what the results of such variation might be, or even a suggestion to vary it at all. Thus, catalyst dissolution is the only recognized result of using diethylene glycol monobutyl ether, as disclosed by Blum.

Beginning then with that understanding, Appellant notes that Blum's discussion of suitable types and amounts of catalysts includes a considerable number of compounds and classes thereof, as well as a considerable range of catalyst use levels. For example, Blum states the following:[50]

> Suitable catalysts for accelerating the formation of urethane between the polyols, the polyfunctional compounds, optionally water, and the polyisocyanates are, for example: tertiary amines such as dimethylbenzylamine, N,N,N',N'-tetramethyldiaminodiethyl ether, bis(dimethyl-aminopropyl) urea, N-methyl- respectively N-ethylmorpholine, dimethylpiperazine, 1,2-dimethylimidazol, 1-azo-bicylo(3,3,0) octane, and preferably triethylene diamine, metal salts such as tin dioctoate, lead octoate, tin diethylhexoate, and preferably tin (IV) salts such as dibutyltindilaurate, dibutyltindiacetate, tetrabutyltindisulfide and bis-(tri-n-butyltin) oxide, as well as preferably mixtures of tertiary amines and organic tin salts, preferably used are from 0.1 to 5.0 parts by weight catalyst based on tertiary amines and/or from 0.1 to 1.0 parts by weight metal salts based on the weight of components (a), through (c).

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[49] Final Office Action, page 4, first full paragraph
[50] Blum, column 12 lines 26-42

Some of these compounds (e.g., N-ethylmorpholine) are liquids under ambient conditions, and there is no indication that Blum would choose to dissolve liquid catalysts in ethylene glycol monobutyl ether (or indeed in any solvent at all). As noted above, Blum's only known criterion for determining how much ethylene glycol monobutyl ether to use is that it be enough to dissolve the catalyst, and this amount would be expected to differ depending upon the amount and type of catalyst chosen. Indeed, for other catalysts an entirely different catalyst solvent might need to be chosen, or none at all.

The Office Action cites *In re Aller* to establish that, where the general conditions of the claims are disclosed in the prior art, discovering the optimal or workable ranges involves only routine skill in the art. The Office Action also cites *In re Boesch* to establish the point that discovering the optimum value of a result effective variable involves only routine skill in the art. However, a particular parameter must first be recognized in the prior art as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977), emphasis added.

A result-effective variable must by definition refer to some specific result against which effectiveness can be measured. As noted above, the Office Action argues that:

> "...employment of ethylene glycol monobutyl ether for dissolution of catalyst is sufficient evidence that ethylene glycol monobutyl ether is a variable which achieves a recognized result of dissolving catalyst."

As Appellant has explained above, the only "result" that varying the level of glycol ether is taught to have any effect on is degree of dissolution (presumably complete dissolution is desired) of a specific catalyst (triethylenediamine). It would be reasonable to assume that the optimum amount for such a purpose would be the smallest amount necessary to dissolve the catalyst in a way that it could be handled. Blum gives two examples (Examples 3 and 5) where he is apparently able to handle the dissolved catalyst without problems, and thus any optimal amount of glycol ether for the purposes of Blum's invention must be no more than the larger of the two amounts used in these examples (i.e., 3.2 pphp). Thus, following the Office Action's argument to its logical conclusion, the skilled artisan might possibly be led to values lower than 3.2 pphp, but not to values of at least 4 pphp.

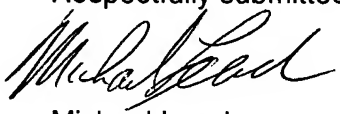
As noted above, Blum does not teach or suggest any effect of ethylene glycol monobutyl ether other than merely dissolving triethylenediamine. However, even if the reader of Blum

nonetheless somehow arrived at the idea to vary the amount of ethylene glycol monobutyl ether to "control catalyst dissolution effects" of some other, undefined sort, there is no evidence that optimization of the amount of ethylene glycol monobutyl ether for such a purpose would lead the person of ordinary skill to deviate from Blum's teaching and, as the Office Action asserts, cause one "to arrive at the products and processes of applicant's claims," i.e., the use of at least 4 pphp of that material.

It would defy logic to assert that optimization of a variable for an undefined purpose would lead to any particular value of that variable, since optimizing for different purposes would be expected to lead to different optimal values. In any case, a *prima facie* case of obviousness would at the least require a suggestion to increase the level of ethylene glycol monobutyl ether beyond that taught by Blum, in order to arrive at the claimed levels. Blum provides no such suggestion, the only criterion appearing to be using "enough" to dissolve the catalyst. Thus, the Office Action has failed to provide a rationale as to how the purported "control of catalyst dissolution effects" by appropriately varying the level of ethylene glycol monobutyl ether would lead to use of at least 4 pphp as presently claimed. In fact, all of the evidence in Blum indicates that it would not lead to such levels, which are higher than those taught by Blum.

In sum, Blum does not teach or suggest the claim feature of at least 4 pphp of a blowing agent enhancer as claimed, nor does the Office Action provide a motivation to deviate from Blum's teachings to arrive at such a level. Bogdan does not remedy this deficiency. Since this claim feature has not been provided by the Office Action, the combination of Blum and Bogdan does not support a *prima facie* case of obviousness, and Appellant submits that the rejection of claims 1, 6-17, and 21-30 should be reversed.

Respectfully submitted,



Michael Leach
Attorney for Appellant
Registration No. 27,349

7201 Hamilton Boulevard
Allentown, PA 18195-1501
(610) 481-8519

VIII. CLAIMS APPENDIX

What is claimed

1. A composition for producing a polyurethane foam, the composition comprising a polyol, a polyisocyanate, a blowing agent comprising a hydrohalocarbon, and at least 4 pphp of a blowing agent enhancer comprising at least one compound selected from the group consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether, or a mixture of any of these.

6. The composition of claim 1, wherein the at least one compound comprises ethylene glycol monobutyl ether.

7. The composition of claim 1, wherein the hydrohalocarbon comprises at least one fluorine atom per molecule.

8. The composition of claim 1, wherein the blowing agent comprises HCFC-123, HCFC-141b, HCFC-22, HCFC-142b, HFC-134a, HFC-245fa, HFC-245ca, HFC-236ea, HFC-365mfc, or a mixture of any of these.

9. The composition of claim 1, wherein the blowing agent comprises HCFC-141b, HFC-134a, HFC-245fa, or a mixture of any of these.

10. The composition of claim 1, wherein the blowing agent comprises a C1-C4 hydrofluorocarbon having a molecular weight between 50 and 170 g/mol, a boiling point between -60°C and 50°C, and an Ozone Depletion Potential less than 0.10.

11. The composition of claim 1, wherein the blowing agent comprises HFC-134a, HFC-236ea, HFC-365mfc, HFC-245fa, or a mixture of any of these.

12. The composition of claim 1, wherein the blowing agent comprises HFC-245fa.

13. The composition of claim 1, additionally comprising a catalyst.

14. The composition of claim 1, additionally comprising a surfactant.

15. A composition for producing a polyurethane foam, the composition comprising a polyol, a polyisocyanate, HFC-245fa, and at least 4 pphp in total of one or both of ethylene glycol monobutyl ether and dipropylene glycol dimethyl ether.

16. A method of making a polyurethane foam, the method comprising combining a polyol and a polyisocyanate in the presence of 1) a blowing agent comprising a hydrohalocarbon and 2) at least 4 pphp of a blowing agent enhancer comprising at least one compound selected from the group consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether.

17. The method of claim 16, wherein the hydrohalocarbon comprises at least one fluorine atom per molecule.

21. A polyurethane composition comprising a product of a reaction between a polyol and a polyisocyanate, the reaction taking place in the presence of 1) a blowing agent comprising a hydrohalocarbon and 2) at least 4 pphp of a blowing agent enhancer selected

from the group consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether.

22. A composition for producing a polyurethane foam, the composition comprising 1) one but not both of a polyol and a polyisocyanate, 2) a blowing agent comprising a hydrohalocarbon and 3) a blowing agent enhancer comprising at least one compound selected from the group consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether, wherein at least 4 pphp of the blowing agent enhancer is present if said one but not both of a polyol and a polyisocyanate is a polyol.

23. The composition of claim 22, wherein the hydrohalocarbon comprises at least one fluorine atom per molecule.

24. A composition for producing a polyurethane foam, the composition comprising a polyol, a polyisocyanate, a blowing agent comprising a hydrohalocarbon, and at least 4 pphp of a blowing agent enhancer comprising at least one compound selected from the group consisting of ethylene glycol monomethyl ether, ethylene glycol monobutyl ether, ethylene

glycol phenyl ether, diethylene glycol monomethyl ether, propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, propylene glycol monopropyl ether, propylene glycol monobutyl ether, dipropylene glycol dimethyl ether, dipropylene glycol monomethyl ether, dipropylene glycol monopropyl ether, dipropylene glycol monobutyl ether, tripropylene glycol monopropyl ether, tripropylene glycol monobutyl ether and compounds having a molecular weight less than about 500 g/mol and a molecular formula of ROH; wherein:

R is selected from the group consisting of methyl, ethyl, pentyl isomers, hexyl isomers, heptyl isomers, octyl isomers, nonyl isomers, decyl isomers, C5-C10 cycloaliphatic groups, C7-C10 araliphatic groups, C1-C10 aliphatic groups comprising a nitrogen atom or oxygen atom, C5-C10 cycloaliphatic groups comprising a nitrogen atom or oxygen atom, and C7-C10 araliphatic groups comprising a nitrogen atom or oxygen atom.

25. The composition of claim 1 comprising at least 5 pphp of the blowing agent enhancer.

26. The composition of claim 15 comprising at least 5 pphp in total of the blowing agent enhancer.

27. The method of claim 16 wherein the blowing agent enhancer is present in an amount of at least 5 pphp.

28. The composition of claim 21 wherein the reaction takes place in the presence of at least 5 pphp of the blowing agent enhancer.

29. The composition of claim 22 wherein the blowing agent enhancer is present in an amount of at least 5 pphp.

30. The composition of claim 24 comprising at least 5 pphp of the blowing agent enhancer.

IX. EVIDENCE APPENDIX

The Appellant does not rely upon evidence other than that recited in the foregoing sections of this appeal.

X. RELATED PROCEEDINGS APPENDIX

No proceedings other than the present Appeal have transpired relating to the subject matter thereof, and no related decisions have been rendered by a court or the Board.